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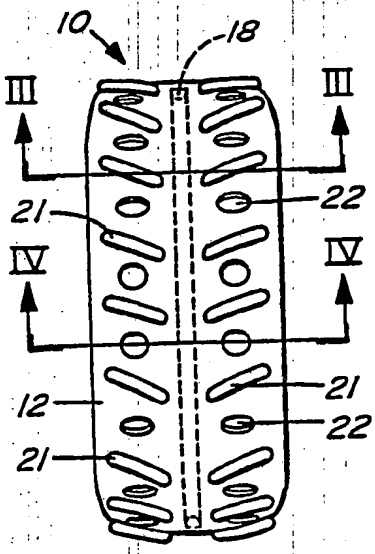
With amended claims and statement.

(54) Title: WHEEL TRACTION DEVICE

(57) Abstract

A removable traction device (10) for a tire (14) on a vehicle comprises a thin elongate member (12) of less than 5 mm thickness for fitting around the tire (14) along the ground-engaging tread of the tire. The elongate member (12) has an inner surface for contact with the ground-engaging tread of the tire (14) and an outer surface which is provided with traction assistance means thereon. In one embodiment, the elongate member is elastic or stretchable in its longitudinal direction. According to another embodiment, the elongate member is in the form of an endless belt and is provided with a circumferentially extending rib (18) on its inner surface for forming a stretch fit around the tire (14). In another embodiment, the member (12) is provided with a plurality of openings (22) between its inner and its outer surfaces.



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WHEEL TRACTION DEVICE

FIELD OF THE INVENTION

This invention relates to a traction device for a motor vehicle tire, in particular, for improving the traction between the tire and a slippery or wet surface.

BACKGROUND OF THE INVENTION

Certain tires are usually not suitable for use in snowy road conditions and it has been the practice to put standard chains or cable chains on tires for use on snow covered surfaces. The fitting of such cables or chains is cumbersome and time consuming. An alternative is to provide specially designed snow tires which can be fitted to a vehicle for use during winter conditions but these tires need to be removed and replaced with normal tires for normal use.

Other types of traction devices are also known, such as described in U.S. Patent No. 3,335,776 which describes an expendable traction device which comprises a band of flexible material which is fitted around the tire and bonded to the tire by means of a pressure adhesive. Various other traction aids are described in U.S. Patents 2,262,349; 2,856,979; 3,396,771; 3,857,426 and 3,926,239.

The prior art traction devices generally comprise relatively thick casings, which although flexible, are not elastic or easily stretchable in the longitudinal direction, i.e. circumferentially of the tire around which the traction device is fitted. The applicant has found that by providing a traction device which is elastic at least in the longitudinal direction but preferably also in other directions, and which is

relatively thin and fitted onto a tire by means of a stretch fit, provides a traction device which hugs the tire and resists becoming dislocated from the tire during use and which, on the other hand, is easily installed on a tire, without the necessity of lifting the tire from the ground surface.

The applicant has also found that it is advantageous to provide openings in the traction device which expose the tread of the tire therethrough.

SUMMARY OF THE INVENTION

According to the invention, there is provided a removable traction device for a tire, comprising an elongate member for fitting around the tire along the ground-engaging tread of the tire and having an inner surface for contact with the ground-engaging tread of the tire and an outer surface which is provided with traction assistance means thereon and wherein the member has a thickness of no greater than about 5 mm and is elastic in its longitudinal direction. The member preferably has a thickness of from about 0.75 to about 3.5 mm. According to one preferred embodiment, the member may have a thickness of about 1 mm.

The elongate member may be in the form of an endless belt operable to be placed around the tire in a stretch fit. According to a preferred embodiment, the member resembles a conventional inner tube with respect to the material from which it is manufactured and its thickness.

The traction assistance means may comprise a plurality of protrusions distributed over the outer surface of the member. The member and the protrusions may

be integrally molded from an elastomeric material. According to an alternative embodiment, the protrusions may comprise metallic members which are attached to the outer surface of the member. According to one embodiment, the traction assistance means may comprise one or more ridges extending in transverse directions along the outer surface of the member.

At least one opening may be provided in the member between the inner and the outer surfaces thereof. Preferably, a plurality of openings is provided between the inner and the outer surfaces.

Also according to the invention, there is provided a removable traction device for a tire comprising an annular member of an elastomeric material for fitting around the tire and having an inner surface for contact with the ground-engaging tread of the tire and an outer surface for ground contact and further comprising a circumferentially extending rib on the inner surface of the member. The rib is preferably elastic in its longitudinal direction.

Further according to the invention, there is provided in combination, a pneumatic tire having sidewalls and a ground-engaging tread between the sidewalls and a removable traction device for the tire comprising an annular member of an elastomeric material for fitting around the tire and having an inner surface for contact with the ground-engaging tread of the tire and an outer surface for ground contact, wherein the tire and the traction device are provided with mating formations for locating the traction device in position on the tire.

BRIEF DESCRIPTION OF DRAWINGS

The invention will now be described by way of an example, with reference to the accompanying drawings, in which:

Figure 1 is a side view of a traction device, according to the invention, shown mounted on a tire;

Figure 2 is an end view of the traction device of Figure 1;

Figure 3 is a section taken along the lines III-III in Figure 2; and

Figure 4 is a section taken along the lines IV-IV in Figure 2.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

In Figures 1 to 4, reference numeral 10 generally indicates a traction device which is in the form of an annular member or cover 12 for fitting around a vehicle tire 14 over the traction surface of the tire 14. The cover 12 effectively forms an outer skin around the tire 14, covering the tread 15 of the tire 14 and part of the sidewalls 17 of the tire 14. The cover 12 has an inner surface 12.1 and an outer surface 12.2.

The cover 12 is preferably of an elastomeric material, such as rubber or a synthetic rubber or any other suitable synthetic plastics material. The cover 12 may be of the same material as a conventional inner tube and of a thickness similar to that of a conventional inner tube. In particular, the cover is elastic in the longitudinal or circumferential direction, as indicated by

the arrow 16 in Figure 1. A material which has been found suitable for the cover 12 is the type of butyl rubber from which commercially available inner tubes are made and which is stretchable in all directions

Typically, the cover 12 may be of a thickness in the order of 1/32 inch (0.80 mm), such as the thickness of a standard type inner tube, MR 14/15, to fit fourteen or fifteen inch rims.

The purpose of the elastomeric property of the cover in the circumferential direction is to assist the grip of the cover 12 on the tire 14, to counteract dislodgement or removal of the cover 12 during use, for example, as a result of centrifugal forces generated by the rotating tire.

The cover 12 is provided in different sizes to fit different sizes of commercially available tires. The arrangement is preferably such that, in each instance, the cover will form a stretch fit around the particular tire size for which it is intended.

In order to assist this gripping action, the cover 12 is provided with a circumferential rib 18 extending along the centre thereof. The rib 18 is elastic in its longitudinal direction and is pre-stressed for a particular tire size. The rib 18 may be integrally moulded with the cover 12, as shown in Figures 3 and 4, or it may comprise a cord of a suitable stretchable material, such as natural rubber or neoprene rubber, which is attached by means of a suitable adhesive to the inner surface 12.1 of the cover 12. A cord of 1/4 inch (6.35 mm) diameter has been found to be satisfactory. A wetsuit repair glue has been found to be a suitable adhesive because of its properties of bonding rubber or

neoprene very well under stretch conditions. To improve the bond, the inner surface 12.1 of the cover 12 is treated with an emery cloth or abrasive to give a strong bond between the rib 18 and the cover 12. To increase the bonding surface, the cord may be cut in half longitudinally.

In making a prototype of the cover 12 by cutting away the central annular portion of a conventional inner tube such as the type referred to above, the talc from the inner tube was washed with methyl hydrate before the surface treatment.

The rib 18 also assists in locating the cover 12 in position on the tire 14. This is particularly so if the cover 12 is used with a commercially available tire such as produced by GOODYEAR™ under the name of AQUATRED™, which tire is provided with a centrally located circumferentially extending recess 20, such as shown in Figures 3 and 4.

Apart from the above-described embodiment where the cover 12 is intended for use with any commercially available tire or with a tire having a circumferential groove, it is envisaged that tire and cover combinations may be manufactured in which the tire and cover are provided with mating formations for locating the cover in position on the tire and for assisting the grip of the cover on the tire. For example, a plurality of recesses may be provided on the tire to engage with mating projections on the cover.

As shown in Figure 2, the cover 12 is provided with traction assistance means in the form of a plurality of transverse ridges or ribs 21. The ribs 21 may be integrally moulded with the cover 12 or alternatively the

ribs 21 may be attached by means of a suitable adhesive. If desired, the ribs 21 may be arranged to conform with a groove pattern of the tread of a particular tire, to enhance the grip of the cover 12 on the tire. In the present example, the ribs 21 are arranged in transverse directions, to fit the grooves on the tread of a GOODYEAR™ AQUATRED™ tire and, in particular, to coincide with every fourth transverse groove of the tread of the tire.

A suitable material for the ribs 21 has been found to be neoprene rubber cord with a diameter of 1/4 inch (6.35 mm), which has been cut in half longitudinally. Alternatively, the ribs 21 may be of a natural rubber cord. A suitable size has been found to be a rubber cord of 3/8 inch (9.5 mm) diameter which has been cut in half longitudinally.

Holes 22 are provided between the ribs 21. The holes 22 serve two purposes: i) the holes provide a means to allow snow particles to escape, should snow accumulate between the sidewall 17 of the tire 14 and the cover 12, and ii) they provide an opportunity for the tread of the tire 14 to work with the traction device 10 to provide better traction.

It is also envisaged to thicken the circumferential edges 24 of the cover 12 to enhance the gripping of the cover 12 on the tire 14.

In a further embodiment of the invention, the ribs 21 cross members may be provided with an abrasive material such as a CARBORUNDUM™ abrasive or chopped wire embedded therein. As the abrasive particles on the surface wear during use, the upper surface of the ribs 21

will wear away and expose new abrasive particles for friction contact with the ground surface.

It is expected that the traction device 10 will replace the use of cumbersome articles, such as snow chains or the need to change to snow tires in wintry conditions. This will allow a motorist to make use of all-season tires with a set of traction devices 10, therefore dispensing with the need to change tires.

The traction device 10 is easily fitted to the wheel of a car by simply placing the device 10 over the upper part of the tire 14 not touching the ground surface, so that it hangs down towards the ground stretched over the upper portion of the tire and then driving the car forward slightly so that the rest of the device can be installed onto the tire 14. To remove the traction device 10, the reverse procedure is followed by first removing the device 10 from the top part of the tire and then moving the car forward or rearward to release the bottom part of the traction device 10.

It will be appreciated that the traction assistance means can be adapted to suit different road conditions as well as different types of vehicles, such as buses, trucks, automobiles, etc.

It is envisaged that the traction device according to the invention can be used on not only light vehicles such as automobiles, vans, etc., but also on heavier vehicles, such as trucks and buses.

While only preferred embodiments of the invention have been described herein in detail, the invention is not limited thereby and modifications can be made within the scope of the attached claims.

WHAT IS CLAIMED IS:

1. A removable traction device for a tire, comprising an elongate member for fitting around the tire along the ground-engaging tread of the tire and having an inner surface for contact with the ground-engaging tread of the tire and an outer surface which is provided with traction assistance means thereon and wherein the member has a thickness of no greater than about 5 mm and is elastic in its longitudinal direction.

2. The traction device according to claim 1, wherein the member has a thickness of from about 0.75 to about 3.5 mm.

3. The traction device according to claim 2, wherein the member has a thickness of about 1 mm.

4. The traction device according to any one of the preceding claims, wherein the elongate member is in the form of an endless belt operable to be placed around the tire in a stretch fit.

5. The traction device according to any one of the preceding claims, wherein the elongate member is elastic in both its longitudinal and transverse directions.

6. The traction device according to any one of the preceding claims, wherein the member resembles a conventional inner tube with respect to the material from which it is manufactured and its thickness.

7. The traction device according to any one of the preceding claims, wherein the traction assistance

means comprises a plurality of protrusions distributed over the outer surface of the member.

8. The traction device according to claim 7, wherein the protrusions are formed integrally with the member.

9. The traction device according to claim 8, wherein the member and the protrusions are integrally molded from an elastomeric material.

10. The traction device according to claim 7, wherein the protrusions comprise metallic members which are attached to the outer surface of the member.

11. The traction device according to any one of claims 1 to 6, wherein the traction assistance means comprises one or more ridges extending in transverse directions along the outer surface of the member.

12. The traction device according to any one of claims 1 to 6, wherein at least one opening is provided in the member between the inner and the outer surfaces thereof.

13. The traction device according to claim 12, wherein a plurality of openings is provided between the inner and the outer surfaces.

14. The traction device according to claim 13, wherein the openings are spaced along the longitudinal dimension or circumferentially of the member.

15. The traction device according to claim 14, wherein two rows of the spaced openings are provided, the rows being spaced transversely of the longitudinal or circumferential direction.

16. The traction device according to any one of claims 12 to 15, wherein the traction assistance means comprises raised formations on the outer surface of the member.

17. The traction device according to claim 16, wherein the raised formations comprise transverse ribs spaced along the longitudinal or circumferential dimension of the member.

18. The traction device according to claim 17, wherein a plurality of the openings are provided between the inner and the outer surfaces, the openings being interspaced between the ribs.

19. The traction device according to any one of claims 12 to 15, wherein the traction assistance means comprises an abrasive material attached to the outer surface of the member.

20. The traction device according to any one of claims 12 to 15, wherein the traction assistance means comprises an abrasive material embedded in the member.

21. The traction device according to claim 20, wherein the member is of a synthetic rubber and the abrasive material comprises CARBORUNDUM™ abrasive particles embedded in the synthetic rubber.

22. The traction device according to claim 20, wherein the elongate member is of a synthetic rubber and the abrasive material comprises chopped wire particles embedded in the synthetic rubber.

23. The traction device according to any one of the preceding claims, further comprising a rib on the inner surface of the member and extending longitudinally or circumferentially thereof.

24. The traction device according to claim 23, wherein the rib is elastic in its longitudinal direction.

25. The traction device according to claim 24, wherein the rib is located centrally of the member.

26. A removable traction device for a tire comprising an annular member of an elastomeric material for fitting around the tire and having an inner surface for contact with the ground-engaging tread of the tire and an outer surface for ground contact and further comprising a circumferentially extending rib on the inner surface of the member.

27. The traction device according to claim 26, wherein the rib is elastic in its longitudinal direction.

28. The traction device according to claim 26 or 27, wherein at least one opening is provided in the member between the inner and the outer surfaces thereof.

29. The traction device according to claim 28, wherein a plurality of openings are provided between the inner and the outer surfaces.

30. The traction device according to any one of claims 26 to 29, further comprising traction assistance means on the outer surface of the member.

31. The traction device according to claim 30, wherein the traction assistance means comprises raised formations on the outer surface of the member.

32. The traction device according to claim 31, wherein the raised formations comprise transverse ribs spaced circumferentially around the member.

33. The traction device according to claim 32, wherein the openings between the inner and outer surfaces are interspaced between the ribs.

34. In combination, a pneumatic tire having sidewalls and a ground-engaging tread between the sidewalls and a removable traction device for the tire comprising an annular member of an elastomeric material for fitting around the tire and having an inner surface for contact with the ground-engaging tread of the tire and an outer surface for ground contact, wherein the tire and the traction device are provided with mating formations for locating the traction device in position on the tire.

35. The combination according to claim 34, wherein the annular member is provided with a circumferential rib on the inner surface thereof for engaging with a circumferential groove on the tire.

36. The combination according to claim 35, wherein the rib is elastic in its longitudinal direction.

37. The combination according to claim 36, wherein the annular member is provided with traction assistance means on the outer surface in the form of transverse ribs spaced circumferentially around the annular member.

38. The combination according to claim 37, wherein the annular member is provided with a plurality of openings between the inner and outer surfaces thereof, the openings being interspaced between the ribs.

AMENDED CLAIMS

[received by the International Bureau on 20 May 1993 (20.05.93); original claims 2,4-12,23,24,26-33,36 and 38 cancelled; original claim 1 amended; claims 3,14,15,17,22,34,35 and 37 amended and renumbered as claims 14,3,4,7,12,15,17 and 18; new claims 5,16,19-24 added; claims 13,16,18-21,25 renumbered as claims 2,6,8-11,13 other claims unchanged (5 pages)]

1. A removable traction device for a tire comprising an annular member of an elastomeric material for fitting around the tire in a stretch fit, the annular member having a thickness so that it is easily stretchable for attachment in a stretch fit to a tire seated on a vehicle wheel and having an inner surface for contact with the ground-engaging tread of the tire and an outer surface for ground contact, wherein at least one opening is provided between the inner and outer surfaces and further comprising a circumferentially extending rib on the inner surface.

2. The traction device according to claim 1, wherein a plurality of openings is provided between the inner and the outer surfaces.

3. The traction device according to claim 2, wherein the openings are spaced along the circumferential direction of the annular member.

4. The traction device according to claim 3, wherein two rows of the circumferentially spaced openings are provided, the rows being spaced transversely of the circumferential direction.

5. The traction device according to any one of claims 1 to 4, further comprising traction assistance means on the outer surface.

6. The traction device according to claim 5, wherein the traction assistance means comprises raised formations on the outer surface of the member.

7. The traction device according to claim 6, wherein the raised formations comprise transverse ribs spaced along the circumferential direction of the annular member.

8. The traction device according to claim 7, wherein a plurality of the openings are provided between the inner and the outer surfaces, the openings being interspaced between the ribs.

9. The traction device according to claim 5, wherein the traction assistance means comprises an abrasive material attached to the outer surface of the member.

10. The traction device according to claim 5, wherein the traction assistance means comprises an abrasive material embedded in the member.

11. The traction device according to claim 10, wherein the member is of a synthetic rubber and the abrasive material comprises CARBORUNDUM™ abrasive particles embedded in the synthetic rubber.

12. The traction device according to claim 10, wherein the annular member is of a synthetic rubber and the abrasive material comprises chopped wire particles embedded in the synthetic rubber.

13. The traction device according to any one of the preceding claims, wherein the rib is located centrally of the member.

14. The traction device according to any one of the preceding claims, wherein the thickness of the annular member is in the order of the thickness of an inner tube, which is in the order of about 1 mm.

15. In combination, a pneumatic tire having sidewalls and a ground-engaging tread between the sidewalls and a removable traction device for the tire comprising an annular member of an elastomeric material for fitting around the tire in a stretch fit, the annular member having a thickness so that it is easily stretchable for attachment in a stretch fit to a tire seated on a vehicle wheel and having an inner surface for contact with the ground-engaging tread of the tire and an outer surface for ground contact, wherein at least one opening is provided between the inner and outer surfaces, wherein the tire and the traction device are provided with mating formations for locating the traction device in position on the tire.

16. The combination according to claim 15, wherein the annular member has a thickness in the order of about 1 mm.

17. The combination according to claim 15 or 16, wherein the mating formations comprise a circumferential rib on the inner surface of the traction device and a mating circumferential groove on the tire.

18. The combination according to any one of claims 15 to 17, wherein the traction device is provided with traction assistance means on the outer surface in the form of transverse ribs spaced circumferentially around the annular member.

19. A removable traction device for attachment to a tire when the tire is seated on a rim mounted on a vehicle wheel which is in ground contact, the traction device comprising an annular member of an elastomeric material for fitting around the tire in a stretch

fit, the annular member having an inner surface for contact with the ground-engaging tread of the tire and an outer surface for ground contact, a plurality of circumferentially spaced openings between the inner and outer surfaces to expose the ground-engaging tread of the tire to the ground, the annular member further being provided with an annular rib of elastomeric material extending circumferentially on the inner surface, the traction device, as a unit, being readily stretchable over an upper portion of the tire which is not in ground contact for elastic engagement with the upper portion to seat a first portion of the device in a stretch fit around the upper portion of the tire to maintain the device in position on the tire when the vehicle wheel is advanced along the ground to bring the upper portion of the tire into ground contact and to expose a remaining portion of the tire for stretching a remaining portion of the device over the remaining portion of the tire to complete the attachment of the device to the tire.

20. The traction device according to claim 19, wherein the rib is located centrally of the annular member.

21. The traction device according to claim 19 or 20, wherein two rows of the circumferentially spaced openings are provided, the rows being spaced transversely of the circumferential direction of the annular member.

22. The traction device according to any one of claims 19 to 21, further comprising traction assistance means on the outer surface.

23. The traction device according to claim 22, wherein the traction assistance means comprises raised formations on the outer surface.

24. The traction device according to claim 23, wherein the raised formations comprise transverse ribs spaced along the circumferential direction of the annular member.

STATEMENT UNDER ARTICLE 19

The important feature of the invention is that it is of an elastomeric material which is relatively thin so that it is easily stretchable and that it can be mounted on a tire which is mounted on a vehicle wheel without needing to jack the wheel up from the ground as described in lines 20-30 on page 7 of the specification. Most of the cited prior art relates to relatively thick casings with which this is not possible. The closest prior art of which the applicant is aware is U.S. Patent 2,777,497 to Hildebrandt, copy enclosed, which is cited in the corresponding U.S. application. This patent discloses an anti-skid cover which is of a relatively thin, easily stretchable material, but it does not have a circumferentially-extending rib on its inner surface or openings between the inner and the outer surfaces. Tests have shown that a cover of this type is practically useless because it becomes dislodged from the tire even at very low speeds. By providing the circumferentially-extending rib, as well as at least one opening but preferably a plurality of circumferentially-spaced openings between the inner and outer surface of the cover, as well as transversely extending ridges on the outside of the cover, it is found that the cover remains on the tire so that practically acceptable speeds can be attained by the vehicle.

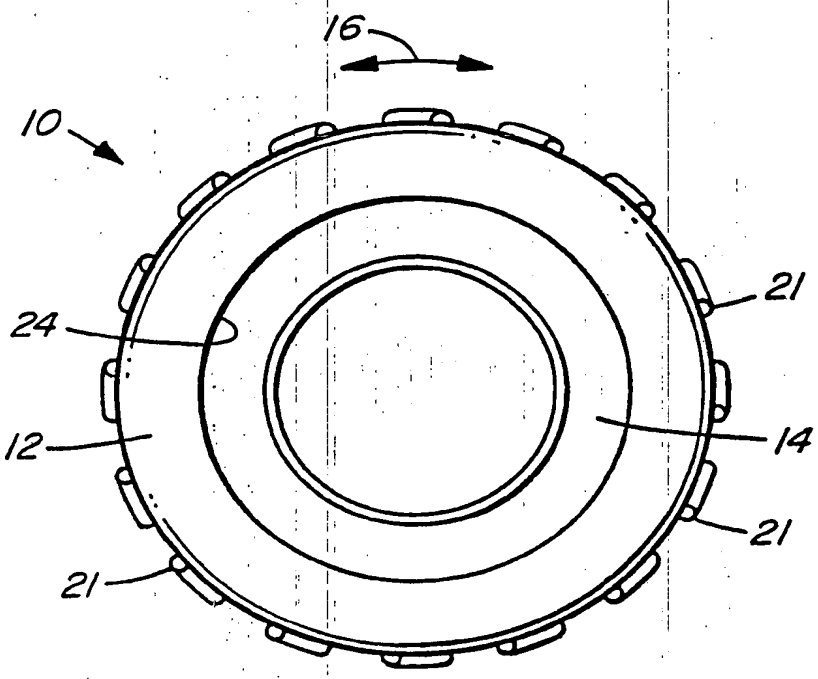

FIG. 1

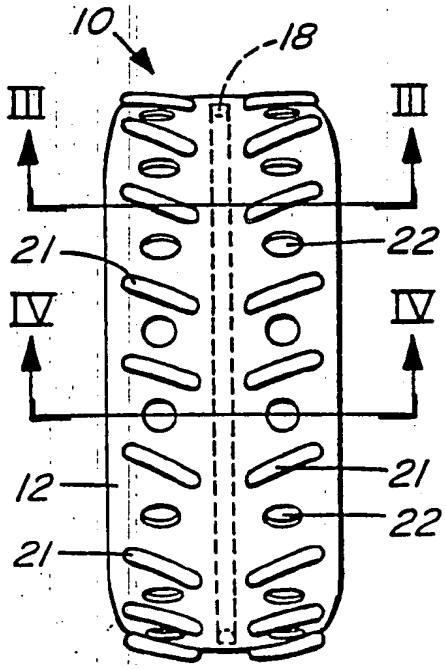

FIG. 2

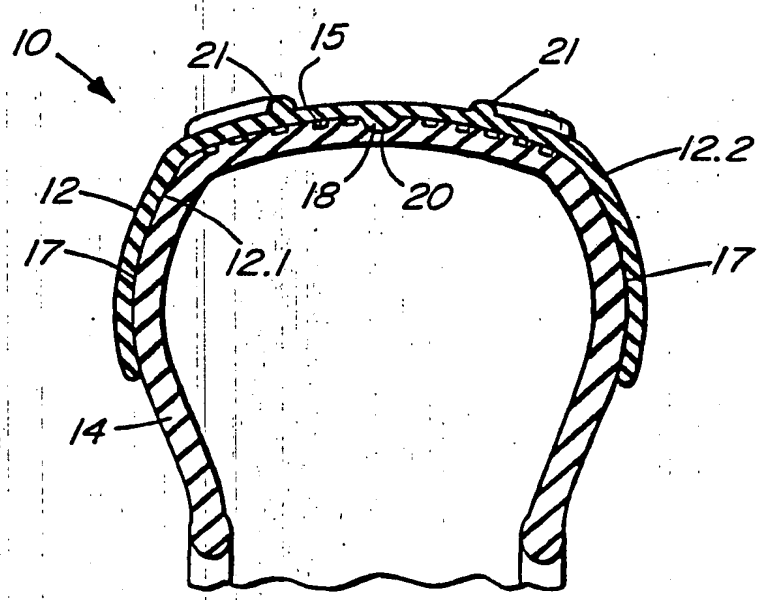
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FIG. 3

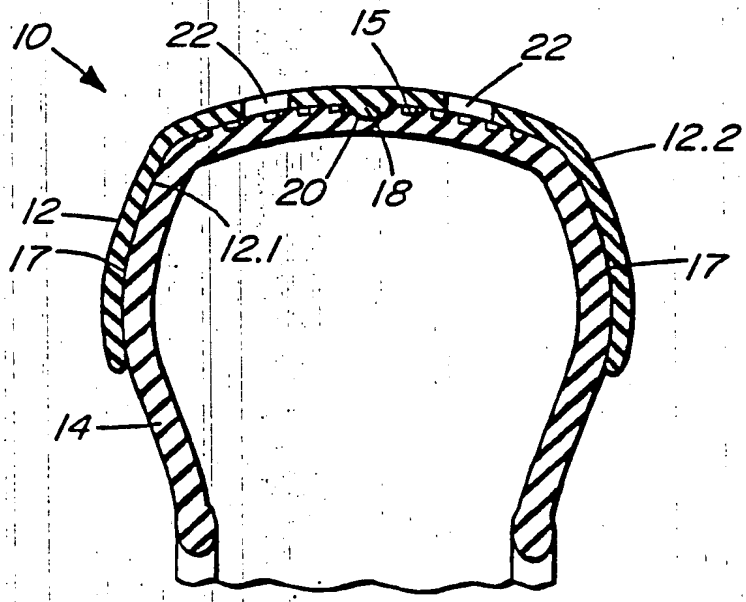
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FIG. 4

INTERNATIONAL SEARCH REPORT

International Application No PCT/CA 92/00564

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 B60C27/16

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	B60C

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document,[11] with indication, where appropriate, of the relevant passages[12]	Relevant to Claim No.[13]
X	CH,A,179 923 (HORBER) 30 September 1935 see the whole document	1-6, 12-14
Y		7-9, 19-25
X	US,A,1 578 803 (COMEY) 30 March 1926 see the whole document	1-6, 12-14
Y	CH,A,159 288 (UHRIG) 31 December 1932 see the whole document	7-9
Y	AT,A,335 859 (DETWILER) 12 April 1977 see page 4, line 39 - line 50; figure 10	19-21

-/--

° Special categories of cited documents :[10]

"A" document defining the general state of the art which is not considered to be of particular relevance

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"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
11 MARCH 1993	25.03.93
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	HAGEMAN M.

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category °	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
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Y	US,A,1 487 165 (JACOBSON) 18 March 1924 see the whole document	23-25
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ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.

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